The averages of these forms may be seen by reference to Chart 1. In flower structure and size the species is not materially different from *S. angustifolia.*

The species occurs on dry, usually stony banks or in gravel, frequently along the dry margins of streams and is found chiefly in association with the drier aspects of the yellow pine forest. Its westward limit corresponds to the western limit of yellow pine in Humboldt County. Although the type was collected along Chico Creek, presumably under oaks, it seldom ranges into the oak woodland. In the Sierra Nevada and North Coast Ranges it seldom occurs above 2500 feet. In southern California it occurs chiefly from 3500–5000 feet. It flowers chiefly during June and July.

Following is the distribution by counties: California. Humboldt; Trinity; Shasta; Tehama; Lake; Napa; Butte; Plumas; Nevada; Yuba; Tulare; Kern; Ventura; Los Angeles; San Bernardino; Riverside.

University of California at
Los Angeles, July 1, 1938.

CONE VARIATION IN DIGGER PINE

W. Palmer Stockwell

Pinus Sabiniana Dougl., the digger pine, is quite constant in its general appearance, having a forked or loosely branched crown, sparse gray-green foliage and often a leaning posture. The cones are dark, the seeds are large and the seed wings are short and thick. However, the degree of variation in cone size and morphology exhibited by this pine is approached by few others.

In central and northern California the cones of digger pine often resemble those of Coulter pine in size and general conformation, with hooked spurs as long as two inches from some of the basal scales. Toward the southern end of its range, however, and near the coast, colonies of digger pine are known that produce cones of an entirely different appearance. These cones are short, broad based, massive, woody, carved in appearance, and the scales are tipped with short, heavy down-turned spines. The general aspect of the cone is similar to that of Torrey pine; so striking is this resemblance, in fact, that the botanist may suspect that these two species have been associated in the past, although there is no overlapping of their ranges at the present time.

Variation of cone size is as great as variation of cone form in the digger pine. In May, 1938, the writer, accompanied by H. L. Mason, visited a colony of large-coned trees near Bartlett

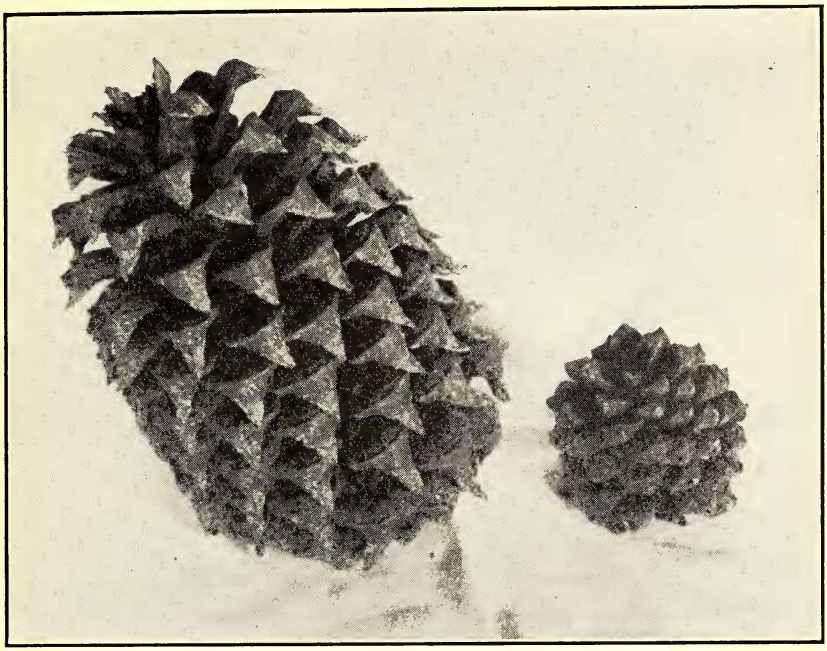

FIG. 1. Size variation in digger pine cones. The large cone is typical of the strain found growing near Bartlett Springs; the small cone represents that which occurs on Figueroa Mountain.

Springs, Lake County, California. Many old open cones gathered from the ground were between ten and twelve inches long and one of these measured thirteen inches from the lowest scale to the apex and was seven and three-fourths inches in diameter. This cone, thoroughly dry and empty of seeds, with the peduncle and some of the basal scales missing, weighed two pounds, ten ounces. At the other extreme of size range are old, open cones recently collected at a location reported by Carl Epling on Figueroa Mountain, Santa Barbara County, California. In general these are short and broad, one of them measuring three and three-fourths inches in length, three and one-half inches in diameter at the base, and weighing but four ounces. These examples are not of rare individual cones or of isolated trees, but of local races or genetic strains represented by many trees, a fact which emphasizes their importance to an understanding of species distribution and delineation in the western pines.

California Forest and Range
Experiment Station, Berkeley,
September, 1938.